

AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1. (Currently Amended) A data transmission method for placing variable-length transmission data in each frame having a fixed time length to transmit the frame, a length of the transmission data being one of two values, X ($X \neq 0$) and 0, the data transmission method comprising the steps of:

at a transmitting side,

calculating an error-detecting code of the transmission data in the frame only if the frame contains the transmission data;

generating frame data containing the transmission data and the calculated error-detecting code of the transmission data if the frame contains the transmission data, and generating frame data that contains neither the transmission data nor the error-detecting code of the transmission data if the frame does not contain the transmission data; and

transmitting the generated frame data; and

at a receiving side,

receiving the frame data;

determining the transmission data and the error-detecting code of the transmission data by determining a predetermined position in the received frame data as the final bit

position of the frame data, and calculating an error-detecting code based on the determined transmission data;

deciding that the frame contains the transmission data if the determined error-detecting code matches the error-detecting code calculated based on the determined transmission data, and deciding that the frame data does not contain the transmission data or the received frame data contains an error if the determined error-detecting code does not match the calculated error-detecting code; and

obtaining the transmission data in the frame based on the result of the decision,

wherein at the receiving side, the step of determining and calculating determines the transmission data and the error-detecting code based on the final bit position where the length of the transmission data is X, and calculates the error-detecting code based on the determined transmission data.

Claim 2. (Canceled).

Claim 3. (Currently Amended) The data transmission method as claimed in claim 1 [[or 2]], wherein, at the transmitting side, the step of generating the frame data generates the frame data in which the error-detecting code is placed after the corresponding transmission data and the bits of the error-detecting code are arranged in the order that is the reverse of the order of the bits of the transmission data.

Claim 4. (Currently Amended) The data transmission method as claimed in claim 1 [[or 2]], further comprising the steps of:

at the transmitting side,

conducting error-correcting coding of the generated frame data; and

conducting interleaving of the frame data that has undergone the error-correcting coding; and

at the receiving side,

conducting deinterleaving of the received frame data; and

conducting error-correcting decoding of the frame data that has undergone the deinterleaving.

Claim 5. (Currently Amended) The data transmission method as claimed in claim 1 [[or 2]], wherein, at the transmitting side, the data transmission method further comprises the step of calculating transmission rate information indicating the number of bits of the transmission data in each frame, and the step of generating the frame data generates the frame data containing the calculated transmission rate information.

Claim 6. (Canceled).

Claim 7. (Currently Amended) The data transmission method as claimed in claim 1, wherein

the data transmission method multiplexes variable-length transmission data for channels in a first channel group of one or more channels and transmission data for channels in a second channel group of one or more channels into each frame having a fixed time length to transmit the frame, and

at the transmitting side,

the step of calculating the error-detecting code calculates, for each channel in the first channel group, the error-detecting code of the transmission data ~~for each channel in the first channel group~~ only if the frame contains the transmission data for ~~[[the]]~~ that channel;

the step of generating the frame data generates, for each channel in the first channel group, partial frame data containing the transmission data for the channel and the calculated error-detecting code of the transmission data for the channel if the frame contains the transmission data for the channel, and generates, for each channel in the first channel group, partial frame data containing neither the transmission data for the channel nor the error-detecting code of the transmission data for the channel if the frame does not contain ~~contains~~ the transmission data for the channel; and

the step of transmitting the frame data transmits the whole frame data containing the generated partial frame data for each channel in the first channel group, and
at the receiving side,

the step of receiving the frame data receives the whole frame data;

the step of calculating the error-detecting code determines the transmission data for each channel in the first channel group and the error-detecting code of the transmission data for the channel by determining a predetermined position in the partial frame data for the channel contained in the received whole frame data as the final bit position and calculates an error-detecting code based on the decided transmission data for the channel;

the step of deciding decides, for each channel in the first channel group, that the partial frame data for the channel contains the transmission data for the channel if the determined error-detecting code of the determined transmission data for the channel matches the error-detecting code calculated based on the determined transmission data for the channel, and decides, for each channel in the first channel group, that the frame does not contain the transmission data for the channel or the partial frame data for the channel contains an error if the determined error-detecting code of the determined transmission data for the channel does not match the error-detecting code calculated based on the determined transmission data for the channel; and

the step of obtaining the transmission data obtains the transmission data for each channel in the first channel group in the frame based on the result of the decision.

Claim 8. (Currently Amended) ~~[[The]]~~ A data transmission method as claimed in claim 2 for placing variable-length transmission data in each frame having a fixed time length to transmit the frame, comprising the steps of:

at a transmitting side,

calculating an error-detecting code of the transmission data in the frame only if the frame contains the transmission data;

generating frame data containing the transmission data and the calculated error-detecting code of the transmission data if the frame contains the transmission data, and generating frame data that contains neither the transmission data nor the error-detecting code of the transmission data if the frame does not contain the transmission data; and

transmitting the generated frame data; and

at a receiving side,

receiving the frame data;

assuming the transmission data and the error-detecting code of the transmission data by assuming one or more final bit positions of the received frame data, and calculating an error-detecting code based on the assumed transmission data;

deciding a position to be the final bit position of the frame data if there is the position in the frame where the assumed error-detecting code matches the error-detecting code calculated based on the assumed transmission data among the assumed final bit positions of the frame data, and deciding that the frame does not contain the transmission data or the received frame data contains an error if there is no position where the assumed error-detecting code matches the calculated error-detecting code; and

obtaining the transmission data in the frame based on the result of the decision,

wherein the data transmission method multiplexes variable-length transmission data for channels in a first channel group of one or more channels and transmission data for channels in a second channel group of one or more channels into each frame having a fixed time length to transmit the frame, and

at the transmitting side,

the step of calculating the error-detecting code calculates the error-detecting code of the transmission data for each channel in the first channel group only if the frame contains the transmission data for the channel;

the step of generating the frame data generates, for each channel in the first channel group, partial frame data containing the transmission data for the channel and the calculated error-detecting code of the transmission data for the channel if the frame

contains the transmission data for the channel, and generates, for each channel in the first channel group, partial frame data containing neither the transmission data for the channel nor the error-detecting code of the transmission data for the channel if the frame does not contain the transmission data for the channel; and

the step of transmitting the frame data transmits the whole frame data containing the generated partial frame data for each channel in the first channel group, and at the receiving side,

the step of receiving the frame data receives the whole frame data;

the step of calculating the error-detecting code assumes the transmission data for each channel in the first channel group and the error-detecting code of the transmission data for the channel by assuming one or more final bit positions of the partial frame data for the channel contained in the received whole frame data and calculates an error-detecting code based on the assumed transmission data for the channel;

the step of deciding decides, for each channel in the first channel group, a position to be the final bit position of the partial frame data for the channel if there is the position where the assumed error-detecting code of the transmission data for the channel matches the error-detecting code calculated based on the assumed transmission data for the channel among the assumed final bit positions of the partial frame data for the channel, and decides, for each channel in the first channel group, that the frame does not contain the transmission data for the channel or the partial frame data for the channel contains an error if there is no position where the assumed error-detecting code of the transmission data for the channel matches the error-detecting code calculated based on the assumed

transmission data for the channel among the assumed final bit positions of the partial frame data for the channel; and

the step of obtaining the transmission data obtains the transmission data for each channel in the first channel group in the frame based on the result of the decision.

Claim 9. (Original) The data transmission method as claimed in claim 7 or 8, wherein dual closed loop transmission power control comprising inner loop transmission power control and outer loop transmission power control is performed for the data transmission between the transmitting side and the receiving side and one or more channels in the second channel group are used as the reference for the outer loop transmission power control without using channels in the first channel group as the reference.

Claim 10. (Original) The data transmission method as claimed in claim 9, wherein the relative ratio between error-correcting coding ratios of the multiplexed channels and the relative ratio between transmission powers for the multiplexed channels are fixed.

Claim 11. (Currently Amended) A data transmission system for placing variable-length transmission data in each frame having a fixed time length to transmit the frame, a length of the transmission data being one of two values, X ($X \neq 0$) and 0, the data transmission system comprising:

in a transmitter,

means for calculating an error-detecting code of the transmission data in the frame only if the frame contains the transmission data;

means for generating frame data containing the transmission data and the calculated error-detecting code of the transmission data if the frame contains the transmission data, and generating frame data that contains neither the transmission data nor the error-detecting code of the transmission data if the frame does not contain the transmission data; and

means for transmitting the generated frame data; and
in a receiver,

means for receiving the frame data;

means for determining the transmission data and the error-detecting code of the transmission data by determining a predetermined position in the received frame data as the final bit position of the frame data, and calculating an error-detecting code based on the determined transmission data;

means for deciding that the frame contains the transmission data if the determined error-detecting code matches the error-detecting code calculated based on the determined transmission data, and deciding that the frame data does not contain the transmission data or the received data contains an error if the determined error-detecting code does not match the calculated error-detecting code; and

means for obtaining the transmission data in the frame based on the result of the decision,

wherein in the receiver, the means for determining and calculating determines the transmission data and the error-detecting code based on the final bit position where the length of the transmission data is X, and calculates the error-detecting code based on the determined transmission data.

Claim 12. (Canceled).

Claim 13. (Canceled)

Claim 14. (Currently Amended) A receiver for receiving, for each frame having a fixed length, frame data containing transmission data and an error-detecting code calculated for the transmission data if the frame contains the transmission data, and receiving, for each frame having the fixed length, frame data containing neither the transmission data nor the error-detecting code of the transmission data if the frame does not contain the transmission data, a length of the transmission data being one of two values, X ($X \neq 0$) and 0, the receiver comprising:

means for receiving the frame data;

means for determining the transmission data and the error-detecting code of the transmission data by determining a predetermined position in the received frame data as the final bit position of the frame data, and calculating an error-detecting code based on the decided transmission data;

means for deciding that the frame contains the transmission data if the determined error-detecting code matches the error-detecting code calculated based on the decided transmission data, and deciding that the frame data does not contain the transmission data or the received frame data contains an error if the determined error-detecting code does not match the calculated error-detecting code; and

means for obtaining the transmission data in the frame based on the result of the decision,

wherein the means for determining and calculating determines the transmission data and the error-detecting code based on the final bit position where the length of the transmission data is X, and calculates the error-detecting code based on the determined transmission data.

Claim 15. (Canceled).